

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)
)
AUDACY CORPORATION)
)
Application for Authority)
to Launch and Operate a) File No. SAT-LOA-20161115-00117
Non-Geostationary Medium)
Earth Orbit Satellite System)
in the Fixed- and Inter-Satellite Services)

COMMENTS OF ELEFANTE GROUP, INC.

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June 26, 2017

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Elefante Group, Inc. (“Elefante Group”), pursuant to Section 309(d) of the Communications Act of 1934, as amended, and Section 25.154 of the Commission’s rules,¹ by its attorneys, hereby submits its comments on the above-captioned application (“Application”) of Audacy Corporation (“Audacy”) in response to the Satellite Policy Branch’s May 26, 2017, Public Notice.²

I. INTRODUCTION AND SUMMARY

As explained herein, Audacy requests use of 11.9 GHz of inter-satellite links (“ISL”) spectrum (and over 20 GHz overall) to generate 15 Gbps of throughput *worldwide* for crosslinks with unidentified third-party satellite licensee “Users” -- the Audacy system will not offer communications to ground-based customer earth stations or terminals. In the case of the 22.55-23.55 GHz Inter-Satellite Services (“ISS”) band, 8.4% of the total ISS spectrum Audacy requests, Audacy’s ISS system design would broadcast its signals toward a large part of the

¹ 47 U.S.C. § 309(d); 47 C.F.R. § 25.154.

² DA 17-254, Report No. SPB-271 (Sat. Pol. Branch May 26, 2017) (“Public Notice”).

Earth's surface at any given time and, therefore, present significant potential for harmful interference into co-primary Fixed and Mobile systems, including emerging, high-density, high-frequency re-use terrestrial broadband applications such as those planned by Elefante Group. The Audacy proposal is also spectrally inefficient relative to other uses of the band – Elefante Group's planned operations, as described below, will be capable of providing hundreds of Tbps of capacity in the United States alone compared to the 15 Gbps Audacy will provide globally (less than one tenth of one percent of Elefante Group's planned capacity in the United States using a fraction of the spectrum Audacy apparently requires). The Commission should defer action on the Audacy Application as presented and direct Audacy to work with interested parties, including Elefante Group, to explore and develop enhanced spectrum sharing solutions that would allow each to utilize the ISS bands in question efficiently and effectively so as to realize the spectrum's maximum potential for multiple systems and types of users. Elefante Group would welcome the opportunity to work with Audacy expeditiously so as to not unduly delay the pursuit of the system plans of either Audacy or the Elefante Group.

II. ELEFANTE GROUP AND ITS INTEREST IN THE AUDACY APPLICATION

Elefante Group, a United States corporation founded in 2015, is developing high-density, high-frequency re-use terrestrial broadband communications and Internet of Things (“IoT”) solutions that will support a variety of advanced communications and sensing needs. Elefante group is working closely with Lockheed Martin Corporation to develop the system platform and payloads. Elefante Group aspires to be the first-to-market world leader in persistent stratospheric-based communications and IoT-enabling solutions for the communications, government, institutional, and enterprise sectors. Elefante Group's platform-enabled communications solutions include high-speed broadband connectivity, as well as wireless carrier

and enterprise backhaul and wireless 5G access. The Elefante Group platforms will also provide IoT-enabling applications combining sensing and communications capabilities for control, location, aggregation, processing and packaging of data. Elefante Group has refined an innovative design that possesses unprecedented flexibility and yields superior capacity. Backed by a leadership team with more than one hundred years of experience in the wireless communications carrier, equipment manufacturing, and aerospace sectors, Elefante Group has met funding milestones enabling an aggressive development of the system with Lockheed Martin. Elefante Group is targeting full commercial operations commencing within the next few years.

Elefante Group plans in the near future to meet with Commission staff, file written submissions in relevant Commission proceedings, and take other steps to advance its objective of obtaining authority to implement its systems in existing spectrum allocations in bands above 15 GHz. Communications payloads deployed on Elefante Group's stratospheric platforms in the millimeter wave bands, in the first generation, will each be capable of achieving terabit-per-second operations using approximately 2.5 gigahertz of spectrum and a high degree of frequency use,³ within an operating radius of 50-70 km. The design of Elefante Group's system will permit a high level of spectrum compatibility with other terrestrial systems, including other stratospheric deployments serving the same geographic areas, as well as Fixed Satellite Service ("FSS") and other users of the radio frequency spectrum.

³ Elefante Group is designing its communications payloads to reuse each channel in a cellular pattern of spot beams, each only a few kilometers in diameter, as many as 180-200 times within the footprint of each platform. Elefante is targeting to achieve over 400 bps/Hz in spectral efficiency on an aggregate basis across a single platform's service area.

The 22.55-23.55 GHz band is technically suited specifically for platform-to-end user operations, such as those that Elefante Group will deploy.⁴ As explained below, Audacy in its Application seeks to utilize the same band as a principal home for its “downlink” inter-satellite operations (as well as “uplink” operations) that it refers to as the “Relay-to-User” links. Audacy’s proposed “downlink” operations will illuminate large portions of the earth’s surface and, as analyzed by Elefante Group to date, present a real risk of creating serious interference hazards for emerging, high-density, high-frequency re-use terrestrial broadband applications in the fixed and mobile allocations in the band, such as those of Elefante Group.⁵ Moreover, as detailed later, Audacy’s proposed use is a very inefficient use of the 22.55-23.55 GHz band relative to that of Elefante Group, let alone the many other existing terrestrial users of the band. As explained below, Elefante Group believes there are several system modifications that Audacy should be encouraged to investigate to enhance its spectrum sharing capabilities. Elefante Group would look forward to the opportunity to explore these matters with Audacy further and report back to the Commission on the results before the Commission acts on Audacy’s Application.

⁴ Elefante Group looks to conduct end user-to-platform operations in nearby FSS downlink bands to maximize spectrum compatibility with existing and future users in Ka-band allocations.

⁵ As noted herein, the Audacy system also proposes to use the 24.25-24.75 GHz band for “downlink” operations, part of the band being examined for high altitude platform stations (“HAPS”) within Region 2 by the ITU’s World Radiocommunication Conference in 2019 (“WRC-19”). The Commission should also consider the extent to which Audacy’s proposed operations might adversely impact the deployment of HAPS systems and reduce the effectiveness of their operation.

III. THE AUDACY ISS PROPOSAL

Audacy proposes a completely new application of the ISS within the 22.55-23.55, 24.45-24.75, and 32.3-33.0 GHz bands.⁶ Specifically, Audacy proposes to operate an inter-satellite service with third-party satellite systems. In brief, Audacy's three medium-earth orbit ("MEO") satellites, the so-called "Relay" satellites, will communicate using ISLs with third-party customer low-earth orbit ("LEO") satellites, so-called "User" satellites.⁷ Audacy proposes that its three MEO Relay satellites will communicate with each other using ISLs in different frequency bands -- 54.25-56.90, 57.00-58.20, and 65.00-71.00 GHz.⁸ The Audacy system will not have any ground users; however, there will be feeder link connections from the MEO Relay satellites to the ground operated in FSS bands.⁹ No applications for User satellites have been filed at this time, such that the details of any ISS Relay-to-User ISLs are not known in detail.¹⁰

Rather than connect satellites within a single system at similar orbits, as is typical for commercial ISS, Audacy proposes to connect its system with as-yet-to-be-proposed, designed, and applied for third-party User satellite systems. For Audacy's proposal to work, the User satellite systems will have to first request and receive Part 25 authority in the ISS as well.

The Audacy system will use shared bands and presents an unprecedented spectrum management challenge. Future customer satellites that orbit up to an altitude of 1500 km will

⁶ Audacy will use other ISL bands as well. Relay-to-Relay links between the three Audacy MEO Relay satellites will utilize the 54.25-56.90, 57.00-58.20, and 65.00-71.00 GHz bands. Narrative Statement, table 2, p. 22.

⁷ Application, Narrative Statement, at 3.

⁸ *Id.*, at 2.

⁹ *Id.*

¹⁰ In the Public Notice, the Satellite Policy Branch deferred a decision whether to invite additional applications in the ISS bands named in Audacy's Application, including the 22.55 and 23.55 and 24.25-24.75 GHz bands. Public Notice at 3.

qualify as Base User satellites.¹¹ The “downlinks” from the three MEO Relays to the Base User satellites, as a byproduct of the ISS operation using relatively unfocused beams, will illuminate much of the earth’s surface at all but the lowest elevation angles, as shown in Audacy’s Narrative Attachment. Specifically, Audacy depicts the Base User scenario coverage beam pattern in Figure III-3, reproduced below on the left.¹² Audacy recognizes that the broad ground coverage from its beams in the Base Use scenario raises concerns about potential interference to co-band Fixed and Mobile operations.¹³

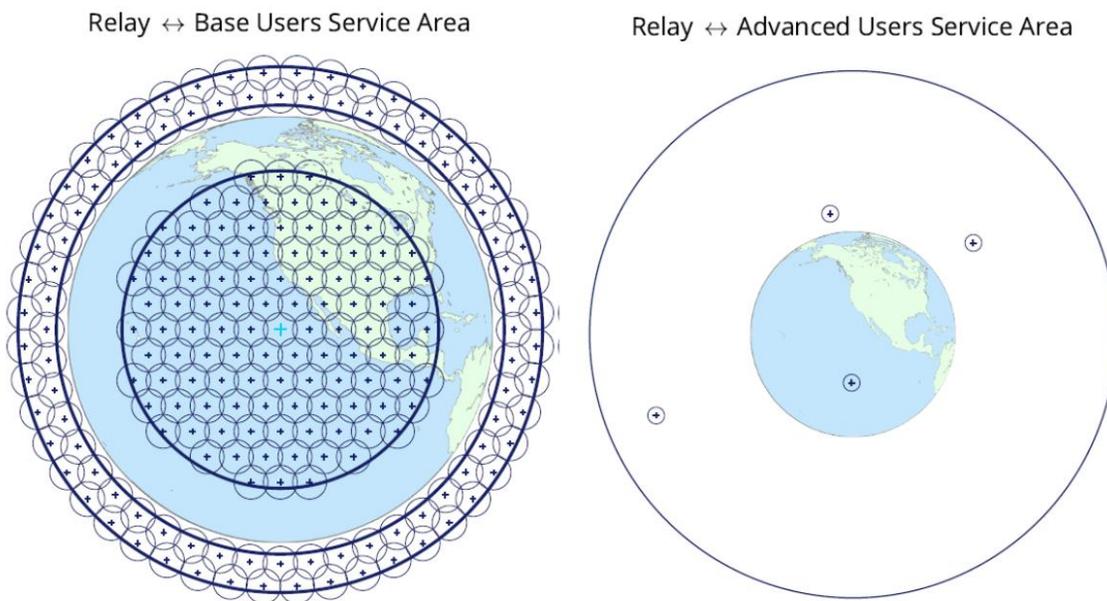


Figure 1: Figures III-3 and III-4 from the Audacy Narrative Statement

On the right, Figure III-4 from the Narrative Statement depicts Audacy’s Advanced User service, whereby the MEO Relays connects to third-party User satellites using the same ISL

¹¹ Narrative Statement, at 16.

¹² See Narrative Statement, at 18.

¹³ *Id.*, at 60.

bands as the Base service, at orbits up to 10,000 km. In contrast with the Base User scenario, Audacy in the Advanced User scenario will utilize trained spot beams.¹⁴ Audacy contends that “[t]he orbital distribution of Users in each Relay’s field of view means that the Advanced spot beams will rarely intersect the Earth, eliminating potential interference with terrestrial users of the same spectrum.”¹⁵ Based on Elefante Group’s preliminary review, the potential for harmful interference from the downlinks in the Advanced User scenario appears to be more limited because the transmissions from the MEO Relays track the User satellites and focus their energy as depicted on the right, although some coordination will still be required to ensure terrestrial systems and Audacy’s operations are compatible.¹⁶ By contrast, the Base Use scenario will involve overlapping beams that will continuously illuminate a large contiguous area of the earth’s surface for extended periods of time depending on the orbits of the MEO Relay satellites.

IV. THE POTENTIAL FOR HARMFUL INTERFERENCE FROM THE AUDACY SYSTEM IN THE 22.55-23.55 GHZ FIXED AND MOBILE BANDS

The 22.55-23.55 GHz band is allocated on a co-primary basis to Fixed Service, Mobile Service, and the ISS. With rare exceptions, to Elefante Group’s knowledge, ISL link geometry, such as within the Iridium system which currently has the sole U.S. commercial ISS authorization in the 22.55-23.55 GHz band,¹⁷ has traditionally been between satellites in single system constellations with similar enough orbital altitudes that beams are not directly aimed at

¹⁴ See Narrative Statement, at 20.

¹⁵ *Id.*, at 20.

¹⁶ Elefante Group continues to study the information in the Application regarding the Advanced User scenario operating parameters to ascertain what steps may be required to ensure spectrum compatibility with Elefante Group’s operations.

¹⁷ Iridium is authorized to operate ISLs within 23.18-23.38 GHz.

the Earth.¹⁸ Further, Elefante Group understands that ISLs heretofore have been characterized by narrow beam transmissions trained on the receive satellites rather than wide beams.

Applications within the Fixed and Mobile services historically have typically used low elevation geometries for terrestrial communications. This “typical” geometry promotes spectrum compatibility with terrestrial applications by guaranteeing significant isolation between the services due to range and antenna isolation with neither directive transmit nor receive antennas aimed at each other, as depicted in the following diagram.

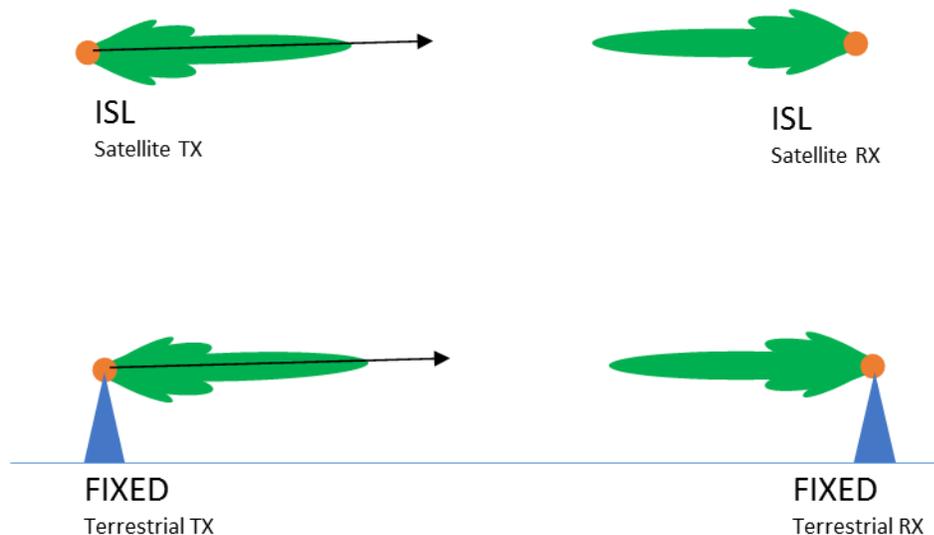


Figure 2: Typical applications within ISS and Fixed service links have significant isolation to interference

A similar scenario to the fixed configuration occurs where mobile stations communicate with base stations. In both the fixed and mobile scenarios, the orientation and directional

¹⁸ Elefante Group recognizes that in its 2000 Inter-Satellite Service Order, the Commission liberalized the ISS to permit links between GSO and NGSO space stations which inherently are at different orbits. *In the Matter of the Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Report and Order, IB Docket No. 99-81, FCC 00-302, ¶ 13 (2000). However, that Order can by no means be interpreted as an endorsement of the Audacy Base User approach which basically involves illumination of a large fraction of the earth’s surface by the MEO Relay space stations at any given time.

characteristics of both the terrestrial and space-based antennas provides a significant measure of interference protection. Naturally, the situation becomes more complicated where the fixed links or mobile-to-base links are not limited to low elevation angles, which may become more common in the near future as commercial mobile radio systems become more dense and there are increasing incidence of higher elevation look angles, certainly above five degrees and perhaps much higher, when one of the terrestrial stations in a communications path is on a mountain, on the top of a tall building, on a UAV, or a mobile is in close vicinity of a base station antenna deployed on a tower.

The Audacity system represents a departure from typical ISL geometry,¹⁹ as described above, with both fixed beams in a pattern covering the Earth at higher elevation angles, and steerable beams tracking across the Earth's surface. Acknowledging the potential for interference to non-satellite, terrestrial systems, the Application explains that Audacity will rely upon several measures to minimize the potential for interference to co-band terrestrial users.²⁰ As an initial matter, Audacity states that it will operate within ITU power flux density ("PFD") limits for signals hitting the earth.²¹ But, recognizing that meeting the PFD limit alone is not sufficient to protect terrestrial users from harmful interference, the Audacity Base service lay

¹⁹ Such use is akin to an inter-satellite use of the Fixed-Satellite Service. Most recently, at the May 2017 meeting, ITU Working Party 4A considered the issue as to whether a restriction of "Earth-to-space" on an FSS allocation limits operations to links between an earth station and a space station, or whether it instead limits operations to links operating in the Earth-to-space direction to support communications between non-GSO satellites operating in low-Earth orbit or medium-Earth orbit with a space station in the geostationary orbit. WP 4A did not conclude on the matter and rather thought it would be appropriate to consider under a specific WRC agenda item. *See* ITU, Chairman, Working Party 4A, Report on the Meeting of Working Party 4A (Geneva, 3-12 May 2017), Document 4A/364-E (dated 9 June 2017) at 22.

²⁰ Elefante Group is employing numerous other techniques into its system design as well to enhance spectral compatibility with other services and users.

²¹ *See* Narrative Statement at 75-76.

down pattern takes into account historically typical applications within the fixed service by not including beams where they would be received at the ground at lower elevation angles: “neither Relay nor Gateway shall transmit when the Relay look angle elevation falls below 5° over the horizon.”²² However, as explained above, terrestrial user look angles are likely to with increasing frequency exceed five degrees and will thus encounter in-line interference as Relay to User links line up with terrestrial communications paths. See Figure 3. This will regularly be the case with the Elefante Group deployments.

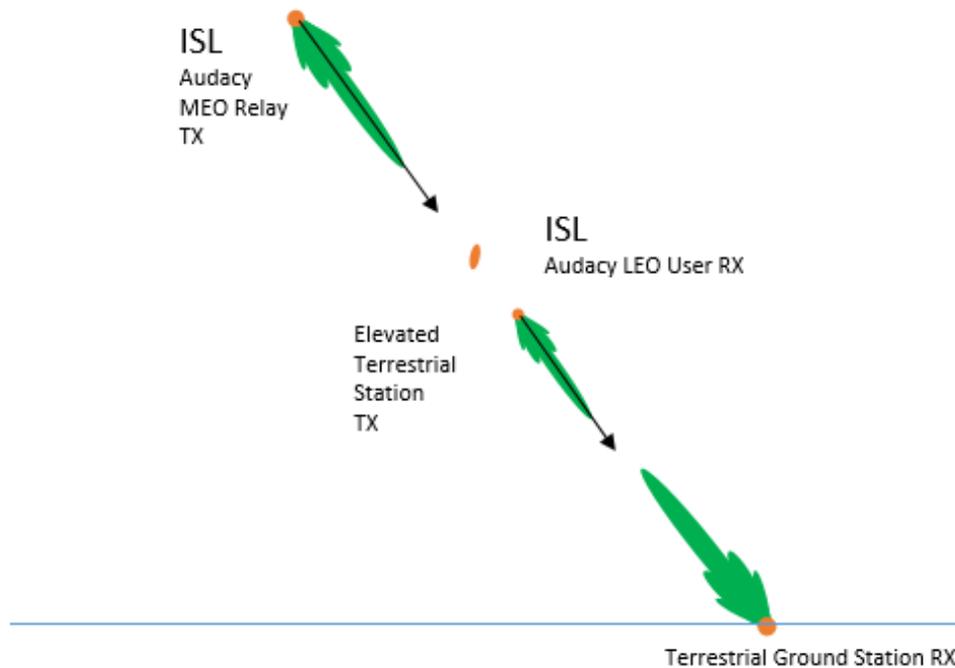


Figure 1: Audacity proposal produces in-line interference events with terrestrial service transmitters at altitude.

Further, Audacity claims that it “will use advanced coding and modulation (‘ACM’) and adaptive power control to apply Network throughput capacity only where it is needed” as a method of

²² Narrative Statement at 21.

interference protection.²³ However, Audacy fails to explain sufficiently how it would take advantage of these capabilities to allow a Fixed or Mobile system, such as the one Elefante Group plans, to accept that harmful interference would be avoided.

Elefante Group is particularly concerned about this potential for interference from the MEO Relay-to-User “downlinks” to its planned stratospheric platforms. Although Elefante Group will operate within either the existing Fixed or Mobile service allocations in the 22.55-23.55 GHz band, in order to enhance its spectrum compatibility with other terrestrial users, Elefante Group is designing a system that would ensure that the signal strength of its platform-to-user links operate under the PFD limits that apply to satellites in the band. In that case, were the Audacy system to be implemented, Relay-to-User signals that lay down a PFD at the limit during an in-line interference event in the same channel(s) would create serious potential for harmful interference to Elefante Group ground receivers. Indeed, Elefante Group’s analysis indicates that, if Elefante Group is operating at the PFD limit levels, the PFD of the Audacy Relay-to-User system would have to be reduced by 25 dB from the maximum ITU PFD limit to ensure compatibility and reduce the interference threat. Audacy’s Narrative Statement suggests that in most cases the Base scenario would operate 10 dB below the PFD limits (and 20 dB in the Advanced User scenario).²⁴ Accordingly, to be compatible with the planned Elefante Group operations –Elefante Group will, for purposes of maximizing spectrum compatibility, operate within the satellite PFD limits – the PFD of Audacy’s Relay-to-User links at the earth’s surface would have to be reduced by 15 dB in the Base User scenario and 5 dB in the Advanced User scenario. Although confirmation from Audacy would be required, it may be that Audacy could

²³ See Narrative Statement at 16.

²⁴ *Id.*, at 76, Figure VI-6.

exploit the ACM and adaptive power control capabilities it claims for its system to achieve these reductions as needed.²⁵

The potential for interference to other applications in the 22.55-23.55 GHz is also manifest in recent activity in ITU Working Party 5B (“WP 5B”) concerning aeronautical mobile service (“AMS”) in the band. As reflected in Annex 14 to the WP 5B Chairman’s Report, issued on June 16, 2017, WP 5B is considering the establishment of technical characteristics and protection criteria for AMS systems in the frequency bands 22.5-23.6 GHz (as well as 25.25-27.5 GHz) for the purposes of sharing and compatibility analyses.²⁶ As Annex 14 makes clear, the AMS equipment may support a variety of functions, such as “scientific research, remote sensing, fire-fighting, land and crop surveying, pipeline monitoring, and emergency management applications,” and found on both manned aircraft or unmanned aircraft systems (“UAS”). AMS data links may be between ground and aeronautical stations (or between aeronautical stations), the work of WP 5B on this issue underscores the need to better understand the potential for interference and to take steps to mitigate it where the risk of harmful interference is deemed unacceptably high. The Audacy Application make no effort to specifically address the potential for interference to AMS air-to-ground links when in-line interference events occur.

V. THE AUDACY SYSTEM WOULD PRESENT POTENTIAL INTERFERENCE TO HAPS SYSTEMS IN THE 24.45-24.75 GHZ BAND WHICH IS UNDER STUDY FOR WRC-19

Audacy also proposes to use the 24.45-24.75 GHz band for ISLs between Relay and User satellites. The 24.45-24.75 GHz band is currently allocated within the U.S. (as well as in all

²⁵ See Narrative Statement at 16.

²⁶ See ITU, Working Party 5B Chairman’s Report, Annex 14 to Document 5B/305-E, Technical characteristics and protection criteria for aeronautical mobile service systems in the frequency bands 22.5-23.6 GHz and 25.25-27.5 GHz (16 June 2017).

three Regions under the ITU radio regulations) to ISL on a co-primary basis with Radionavigation and Radiolocation-Satellite services. However, at the 2015 World Radiocommunication Conference (“WRC”), the members of the ITU resolved to study making the 24.25-27.5 GHz band available for high altitude platform stations (“HAPS”) as part of the Fixed services within Region 2, including the United States.²⁷ Indeed, the United States submitted contributions at the recent Working Party 5C meeting in Geneva regarding HAPS advocating for those studies to be completed and indicating that there were at least two system configurations representing planned deployments in the United States that should be considered in any sharing and compatibility studies.

HAPS, characterized by operations between 20 and 50 km above the Earth’s surface, presents overhead geometry which would appear to suffer in-line interference events from the Audacity system.²⁸ It is expected from recent contributions to the WP 5C meetings in Geneva that HAPS user downlinks may range from 90 degrees elevation down to 15 degrees elevation.²⁹ Thus, the potential for interference is plainly apparent. Before the Commission considers granting the Audacity proposal for ISS links, it should invite further study of potential Audacity-HAPS interference and take into account the potential impact from such interference to HAPS systems in the 24.45-24.75 GHz band. Will HAPS systems, to the extent the 24.25-27.5 GHz band being studied is deprived of full use of this 300 megahertz of spectrum, be deprived of sufficient spectrum for competitive HAPS systems to deploy economically? Further study into

²⁷ WRC-19 Agenda, Item 1.14; *see also* ITU Resolution 160, *resolves to invite ITU-R 4* (WRC-15).

²⁸ Operations below 20 km do not fall within the HAPS definition. *See* 47 C.F.R. §2.1.

²⁹ *See, e.g.*, ITU, Working Party 5C Chairman's Report, Document 5C/292-E (1 June 2017).

the compatibility of the two types of systems is warranted in the interests of sound spectrum management in the public interest.

VI. THE AUDACY SYSTEM APPLICATION IS NOT COMPLETE

The Audacy Application is incomplete with regard to the requested authority to operate Relay-to-User ISLs in the 22.55-23.55 GHz, 24.45-24.75, and 32.3-33.0 GHz bands because it does not, as required in Section 25.114(a) of the Rules, “comprise a comprehensive proposal” of the “[NGSO] space-station constellation.” Specifically, while Audacy proposes to establish crosslinks between its Relay satellites and the User satellites of unaffiliated entities, the Application does not propose or describe the User satellites – which would be part of separate constellations – except in the most generic of ways. In short, except in general terms, the Application does not comprehensively describe the ISS crosslinks because it leaves out one-half of the detail as Section 25.114(a) demands. Nor does the Application seek a waiver of the requirement. As such, it is not possible, in a comprehensive manner, to fully understand and evaluate Audacy’s inter-satellite service proposal.

In previous applications before the Commission to use ISS frequencies, the applicants proposed cross-links between satellites *within the applicant’s constellation*.³⁰ Further, when the Commission modified Section 25.279 in 2000 to make clear that the coordination requirements applicable to parties authorized to deploy ISLs applied to GSOs as well as NGSOs, the Commission noted that it would also apply “between satellites *in a system* incorporating GSO

³⁰ Elefante Group could not find any prior ISL authorizations issued by the Commission which involved ISL links between satellites of two different constellations. *See, e.g., Motorola, Inc., Order and Authorization*, 16 FCC Rcd 2432, 2433, para. 3 (Int’l Bur. 2001) (finding that inter-satellite service links would enable applicants’ satellites “to communicate directly with each other”); *EchoStar Satellite Corp., Order and Authorization*, 16 FCC Rcd 2453, 2454, para. 3 (Int’l Bur. 2001) (same); *Teledesic LLC, Order and Authorization*, 16 FCC Rcd 2501, 2501, para. 1 (Int’l Bur. 2001) (same).

and NGSO architectures.”³¹ In short, Elefante Group questions whether the crosslinks between unaffiliated satellites requires a separate application that comprehensively describes the orbits and other technical characteristics of both satellites in the link.

In short, because the Application does not fully describe the Relay-to-User links, should the Commission grant Audacy authority for its ISS links after addressing the other concerns Elefante Group raises, the grants should be conditional on subsequent review of User satellite applications (as well as the outcome of any future Commission proceedings affecting the bands in question). The Commission should underscore that the request for authorization will be fully subject to review when applications are received for the User satellites that complete the other half of the ISLs.³² At the time that those applications are reviewed, the Commission should provide interested parties the opportunity to comment or oppose the Application for the ISS links in their entirety.

VII. FURTHER STUDY AND ANALYSIS SHOULD BE UNDERTAKEN TO ENSURE THE AUDACY SYSTEM IS COMPATIBLE WITH OTHER ALLOCATED SERVICES AND SPECTRALLY EFFICIENT.

The Audacy Application presents the Commission with an unprecedented spectrum management situation, whether to allow an innovative new satellite service that deploys the ISS in an unprecedented way, both in terms of geometry and in connecting the satellites of one company with those of multiple other companies, and, in so doing, presenting interference to

³¹ *In the Matter of the Establishment of Policies and Service Rules for the Mobile Satellite Service in the 2 GHz Band*, Report and Order, IB Docket No. 99-81, FCC 00-302, ¶ 88 (2000).

³² For example, review of the Application does not reveal how many Users satellites there will be, what their orbit or altitude ranges will be (and, thus, whether dynamic power control might limit the potential interfering signal in the spot beam reaching Earth), and so forth, making it very difficult to assess frequency, duration, and strength of interference events.

emerging fixed and mobile applications in the same band that would operate far more spectrally-efficient. The Audacy system demands access to over 20 GHz of spectrum, per its Application, but, according to its website, will offer a system capacity of only 15 Gbps worldwide.³³ In the case of the Elefante Group system, Elefante Group is designing each platform, with a coverage area of approximately 8,000-15,000 kilometers,³⁴ to have a throughput of approximately one Tbps.

While Audacy presents what may be an innovative relay satellite architecture, Elefante Group urges the Commission, in the public interest, to defer action with respect to the ISS bands identified in the Application and direct Audacy to explore means to enhance spectral compatibility with other services in the bands and modify its Application as appropriate.

Elefante Group believes that this approach would not undermine the Audacy innovative vision, but would enhance spectrum sharing in the bands with other allocated services to maximize the use of the spectrum. Options to improve compatibility that the Commission should encourage Audacy to consider, *supported by further study and analysis*, include the following:

1. Audacy could modify its Relay-to-User power to effect a reduction in PFD in the Base User case by 15 dB and in the Advanced User case by 5 dB.³⁵
2. Audacy could consider moving the Relay-to-User ISS links to the V band, specifically within the 2.65 gigahertz Audacy requests at 54.25-56.90 GHz. This would have the added benefit of allowing a smaller antenna size which would enhance the company's appeal to potential cubesat operators, which their website makes clear they are targeting. Any loss in link budget would be more than offset by this gain, particularly since the space station cross-links are above the atmosphere and would not suffer path loss from absorption characteristic of these

³³ The website explains that by 2021 with 100% worldwide coverage, the system capacity will be 15 Gbps. See <https://audacy.space/architecture>.

³⁴ In other words, between approximately 2/3 the size of Connecticut and the size of Connecticut and Rhode Island combined.

³⁵ Elefante Group is also studying whether the expected omnidirectional User link emissions need to be limited so as to prevent interference to emerging innovative systems in the Fixed and Mobile allocations in the 22.55-23.55 GHz band.

bands – although there would be significant absorption making ISLs in this band far less likely to cause interference to future Fixed or Mobile or other terrestrial systems operating in these bands.³⁶

3. Audacy could potentially draw upon the abilities it claims in its Application to “dynamically allocate frequencies, polarizations, and transmit power to Gateway, User, and Relay RF terminals” and “remotely and immediately mute emission from Relays and Gateways should the need arise, for example in the unlikely case of unexpected or unwanted interference events” to better protect terrestrial users in the 22.55-23.55 and 24.45-24.75 GHz bands, although further explanation would be required as to how this would be accomplished and whether it would satisfactorily address interference mitigation objectives.³⁷
4. Audacy could potentially implement a partial reduction of PFD combined with the methods in item 2 to eliminate the potential for interference.
5. Audacy could use the 22.55-23.55 GHz band for User-to-Relay “uplinks” only, eliminating the potential for interference to terrestrial Fixed and Mobile solutions.

Further study and analysis may identify other solutions to improve efficiency and spectral compatibility as well.

In short, based on the described interference geometry with emerging Fixed and Mobile uses in the 22.55-23.55 and 24.45-24.75 GHz bands, measures ensuring compatibility with other co-primary operations in the bands are necessary before the Audacy Application, with parameters as currently presented in the Application, is granted. Elefante Group would welcome to collaborate with Audacy to develop solutions along the lines outlined above to enhance the spectrum sharing capabilities of the Audacy system and maximize the use of the ISS spectrum bands in question for all users.

³⁶ As of June 26, 2017, the Commission’s ULS database reveals that there are no Fixed, Mobile, or other FCC non-satellite licenses in the 54.25-56.90 GHz band.

³⁷ See Narrative Statement at 16. Audacy claims it “will use advanced coding and modulation (‘ACM’) and adaptive power control to apply Network throughput capacity only where it is needed.” *Id.*

VIII. CONCLUSION

For the foregoing reasons, before acting on Audacy's Application, the Commission should defer action on the Application and direct Audacy to explore means to enhance spectral compatibility with other services in the bands, modifying its Application as appropriate. Proceeding in this way will ensure Audacy's ISLs do not frustrate existing and emerging Fixed and Mobile solutions in the 22.55-23.55 and 24.45-24.75 GHz and maximize the use of the spectrum by all users.

Respectfully submitted,

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)
Application for Authority)
to Launch and Operate a) File No. SAT-LOA-20161115-00117
Non-Geostationary Medium)
Earth Orbit Satellite System)
in the Fixed- and Inter-Satellite Services)

DECLARATION OF WILLIAM WHITE

I, William White, declare under penalty of perjury that the following is true and correct:

1. I am Chief Technology Officer to Elefante Group, Inc.
2. I have read and am familiar with the content of the Comments of Elefante Group, Inc. filed on this date in the above-referenced matter. I have personal knowledge of the facts alleged therein pertaining to Elefante's system and its analysis of Audacy's Application, and such facts are true and correct to the best of my knowledge, information, and belief.


William White

Executed on June 26, 2017

CERTIFICATE OF SERVICE

I hereby certify that I have caused a true and correct copy of the foregoing Comments of Elefante Group, Inc. to be served via overnight courier and U.S. Mail on this 26th day of June 2017, to the following:

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